

WHAT IS CLAIMED IS:

1. An apparatus for detecting a heart sound of a living subject, comprising:

a pressure-pulse-wave sensor which has a press surface adapted to be pressed on a body portion of the subject that is distant from a chest of the subject, without intervention of an air between the press surface of the sensor and the body portion, detects a pressure pulse wave produced by an artery of the body portion, and generates a pressure-pulse-wave signal representing the detected pressure pulse wave;

a pressing device which presses the pressure-pulse-wave sensor so that the press surface of the sensor is pressed on the body portion of the subject; and

a heart-sound extracting means for extracting, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a heart-sound component representing the heart sound of the subject, and having frequencies in a prescribed frequency range of above 30 Hz to 600 Hz.

2. An apparatus for detecting a heart sound of a living subject, comprising:

a pressure-pulse-wave sensor which has a press surface adapted to be pressed on a body portion of the subject that is distant from a chest of the subject, without intervention of an air between the press surface of the sensor and the body portion, and includes a plurality of pressure sensing elements

provided in the press surface and arranged in a widthwise direction of an artery of the body portion, each of the pressure sensing elements detecting a pressure pulse wave produced by the artery of the body portion, and generating a pressure-pulse-wave signal representing the detected pressure pulse wave;

a pressing device which presses the pressure-pulse-wave sensor so that the press surface of the sensor is pressed on the body portion of the subject and accordingly each of the pressure sensing elements provided in the press surface is pressed on the body portion without intervention of the air between the press surface and the body portion;

an optimum-element selecting means for selecting one of the pressure sensing elements provided in the press surface, as an optimum pressure sensing element, based on respective magnitudes of the respective pressure-pulse-wave signals generated by the pressure sensing elements; and

a heart-sound extracting means for extracting, from the pressure-pulse-wave signal generated by the optimum pressure sensing element, a heart-sound component representing the heart sound of the subject, and having frequencies in a prescribed frequency range of above 30 Hz to 600 Hz.

3. An apparatus for obtaining information relating to a velocity at which a pulse wave propagates through an artery of a body portion of a living subject, the apparatus comprising:

a heart-sound detecting apparatus comprising a pressure-pulse-wave sensor which is adapted to be worn on the body portion of the subject that is distant from a chest of the subject, detects a pressure pulse wave produced by the artery of the body portion, and generates a pressure-pulse-wave signal representing the detected pressure pulse wave, and

a heart-sound extracting means for extracting, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a heart-sound component representing a heart sound of the subject; and

an information obtaining means for obtaining said information based on a first timing at which the pressure-pulse-wave sensor of the heart-sound detecting apparatus detects a prescribed periodic portion of the heart sound, and a second timing at which the pressure-pulse-wave sensor detects a prescribed periodic portion of the pressure pulse wave.

4. An apparatus according to claim 3, wherein the information obtaining means comprises means for obtaining, as said information, a time difference between the first and second timings.

5. An apparatus according to claim 4, wherein the information obtaining means comprises means for obtaining, as said information, said velocity by dividing, by said time

difference, a distance between a heart of the subject and the body portion thereof distant from the chest thereof.

6. An apparatus for measuring a blood pressure of a living subject, comprising:

an inflatable cuff which is adapted to be wound around an upper arm of the subject;

a blood-pressure determining means for determining the blood pressure of the subject based on a signal which is produced in the cuff while a pressing pressure of the cuff is gradually changed;

a pressure-pulse-wave sensor which is provided in an inner surface of the cuff, has a press surface adapted to be pressed on the upper arm of the subject without intervention of an air between the press surface and the upper arm, detects a pressure pulse wave produced by an artery of the upper arm, and generates a pressure-pulse-wave signal representing the detected pressure pulse wave;

a pressing device which presses the pressure-pulse-wave sensor so that the press surface of the sensor is pressed on the upper arm; and

a heart-sound extracting means for extracting, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a heart-sound component representing the heart sound of the subject, and having frequencies in a prescribed frequency range of above 30 Hz to 600 Hz.

7. A method of detecting a heart sound of a living subject, comprising the steps of

pressing a pressure-pulse-wave sensor on a body portion of the subject that is distant from a chest of the subject, without intervention of an air between the press surface and the upper arm, so that the pressure-pulse-wave sensor detects a pressure pulse wave produced by an artery of the body portion, and generates a pressure-pulse-wave signal representing the detected pressure pulse wave,

pressing the pressure-pulse-wave sensor so that the press surface of the sensor is pressed on the body portion of the subject; and

extracting, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a heart-sound component representing the heart sound of the subject, and having frequencies in a prescribed frequency range of above 30 Hz to 600 Hz.

8. An apparatus according to claim 1, further comprising a noise removing means for removing, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a component having frequencies not lower than 50 Hz.

9. An apparatus according to claim 1, wherein the pressure-pulse-wave sensor comprises no inflatable portion.

10. An apparatus according to claim 2, further comprising a noise removing means for removing, from the pressure-pulse-wave signal generated by the optimum pressure sensing element, a component having frequencies not lower than 50 Hz.

11. An apparatus according to claim 2, wherein each of the pressure sensing elements provided in the press surface comprises no inflatable portion.

12. An apparatus according to claim 6, further comprising a noise removing means for removing, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a component having frequencies not lower than 50 Hz.

13. An apparatus according to claim 6, wherein the pressure-pulse-wave sensor comprises no inflatable portion.

14. A method according to claim 7, further comprising a step of removing, from the pressure-pulse-wave signal generated by the pressure-pulse-wave sensor, a component having frequencies not lower than 50 Hz.

15. A method according to claim 7, wherein the pressure-pulse-wave sensor comprises no inflatable portion.